

# ASSIGNMENT 1

Textbook Assignment: "Boilers," chapter 1, pages 1-1 through 1-42.

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| <p>1-1. A boiler may be defined as a closed vessel in which steam is produced as a result of the burning of fuel.</p> <ol style="list-style-type: none"><li>1. True</li><li>2. False</li></ol> <p>1-2. You are boiling water in an open container at sea level. What is the highest temperature the boiling water can reach when the burner is set for 400°F?</p> <ol style="list-style-type: none"><li>1. 612°F</li><li>2. 400°F</li><li>3. 212°F</li><li>4. 200°F</li></ol> <p>1-3. What value must increase when you want to increase the boiling point of water?</p> <ol style="list-style-type: none"><li>1. Pressure</li><li>2. Heat</li><li>3. Volume</li><li>4. Evaporation rate</li></ol> | <p>1-4. You are boiling water in a closed container while maintaining a constant pressure on the steam and water within it. What is the temperature relationship between the steam and the boiling water?</p> <ol style="list-style-type: none"><li>1. The steam temperature is higher than the boiling water temperature</li><li>2. The temperature of the steam is inversely proportional to the temperature of the boiling water</li><li>3. The temperature of the boiling water is higher than the temperature of the steam</li><li>4. The temperatures of the steam and boiling water are the same</li></ol> <p>1-5. Superheated steam is steam at a temperature higher than the saturation temperature corresponding to pressure.</p> <ol style="list-style-type: none"><li>1. True</li><li>2. False</li></ol> <p>1-6. Which of the following is NOT a required criteria for a boiler to be considered satisfactory for operation?</p> <ol style="list-style-type: none"><li>1. It must be safe to operate</li><li>2. It must be able to generate steam at the desired rate and pressure</li><li>3. It must be economical to operate</li><li>4. It must have a steel floor</li></ol> |
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1-7. What authority establishes design rules for boilers?

1. Society of American Military Engineers (SAME)
2. American Welding Society (AWS)
3. American Society of Mechanical Engineers (ASME)
4. Department of Occupational Safety and Health (OSHA)

1-8. The headers in a sectional-header cross drum boiler are made of what type of material?

1. Forged steel
2. Polished brass
3. Aluminum
4. Cast iron

1-9. Gases are directed across the tubes of the sectional-header cross drum boiler a total of how many times before being discharged from the boiler?

1. One
2. Two
3. Three
4. Four

1-10. What number of plates go into the makeup of the box-header cross drum boiler?

1. Five
2. Two
3. Three
4. Four

1-11. What types of drums are used in the box-header longitudinal drum boiler?

1. Horizontal or inclined
2. Vertical or inclined
3. Vertical or horizontal
4. Longitudinal or vertical

1-12. What types of drums are used in the bent-tube boiler?

1. Steam, water, and tube
2. Tube, crosshead, and water
3. Crosshead, tube, and steam
4. Mud, steam, and water

1-13. Which of the following factors is a disadvantage of water-tube boilers?

1. Little flexibility in starting-up
2. Low productive capacity
3. Considerable danger of disastrous explosion
4. High construction costs

1-14. The Scotch marine boiler is classified as what type of boiler?

1. Water tube
2. Firebox
3. Fire tube
4. Bent tube

1-15. What advantage does the Scotch marine boiler have over other boilers for Seabee use?

1. Its shell does not require reinforcing
2. Its furnace is fired from the outside
3. It is portable
4. It is easy to clean the surfaces of the section below the combustion chamber

1-16. What condition is present when a fusible plug in a Scotch marine boiler blows?

1. The water level in the boiler is high
2. The water level in the boiler is low
3. The plug's tin is intact
4. The plug is covered with water

1-17. Which of the following factors is a disadvantage of the vertical fire-tube boiler?

1. It is not portable
2. It is not self-contained
3. It has a limited capacity
4. It requires too much floor space

1-18. A vertical fire-tube boiler is similar to a

1. Scotch marine boiler
2. horizontal fire-tube boiler
3. straight-tube boiler
4. bent-tube boiler

1-19. The blowdown pipe of a vertical fire-tube boiler is attached to the

1. top of the shell
2. bottom tube sheet
3. lowest part of the water leg
4. outside row of tubes

1-20. When a stationary fire-tube boiler is required, the horizontal-return-tube type is popular for which of the following reasons?

1. It has a relatively low initial cost
2. It is adaptable to a variety of fuels
3. Its replacement tubes are of uniform, size, length, and diameter
4. Each of the above

1-21. What amount of pitch must a horizontal return tubular boiler have to allow sediment to settle towards the rear near the bottom blowdown?

1. 1 to 2 inches
2. 2 to 3 inches
3. 3 to 4 inches
4. 4 to 5 inches

1-22. What means are used in boiler operation to ensure that enough air is available for proper combustion?

1. Chimneys
2. Vents
3. Breechings
4. Draft fans

1-23. What boiler part must have a cross-sectional area 20 percent greater than that of the stack?

1. Breeching
2. Settling
3. Damper
4. Combustion chamber

1-24. What are the two types of fusible plugs?

1. Steam-actuated and temperature-actuated
2. Fire-actuated and temperature-actuated
3. Steam-actuated and water-actuated
4. Fire-actuated and steam-actuated

1-25. What type of fusible plug can be replaced without taking the boiler out of service?

1. Temperature-actuated
2. Fire-actuated
3. Steam-actuated
4. Water-actuated

- 1-26. At what interval should fusible plugs be replaced?
1. Monthly
  2. Quarterly
  3. Semiannually
  4. Annually
- 1-27. A water column is connected at least 6 inches below the lowest permissible water level and at the top of the steam drum for what purpose?
1. To bypass the gauge glass
  2. To indicate steam generation
  3. To control the high-water level
  4. To steady the gauge glass water level
- 1-28. A boiler equipped with a float-operated feedwater control is protected against damage resulting from what condition?
1. Low-water level
  2. High-water level
  3. Closed fuel supply valve
  4. Constantly operating feedwater pump
- 1-29. Other than the low-water cutoff, what operation(s) is/are controlled by the float-operated feedwater control?
1. Operation of the feedwater pump
  2. Operation of the alarm bell
  3. Securing the burners
  4. All of the above
- 1-30. How many electrodes are contained in an electrode probe type of feedwater control?
1. Five
  2. Two
  3. Three
  4. Four
- 1-31. What device allows the boiler operator to determine the water level in the boiler?
1. Gauge cocks
  2. Gauge glass
  3. Try cocks
  4. Site glass
- 1-32. What boiler fitting is considered the most important?
1. Air cock
  2. Feedwater regulator
  3. Safety valve
  4. Surface blow valve
- 1-33. What is the minimum number of safety valves required when a boiler has more than 500 square feet of heating surface?
1. Five
  2. Two
  3. Three
  4. Four

- 1-34. What design feature is common in all boiler safety valves?
1. They must be suitable for any type of installation
  2. They must open and close constantly for long periods of time
  3. They must open at a specified pressure and then close when the pressure drops slightly
  4. They must open completely at a specified pressure and close only after a specified pressure drop
- 1-35. When should the lifting lever on a safety valve be used to check the valve action and clear the seat?
1. As soon as steam pressure starts to build up within the boiler
  2. When the pressure has reached 25 psi within the boiler
  3. When the pressure is at least equal to the safety valve setting
  4. When the pressure within the boiler is at least 75 percent of the safety valve setting
- 1-36. The injector feed system uses an injector that serves both as a boiler feeder and a
1. standby feed unit
  2. cooler sprinkler
  3. main steam stop valve
  4. system flusher
- 1-37. When a steam injector is started, the water supply valve should be turned
1. a quarter of a turn
  2. a half a turn
  3. a full turn
  4. all the way open

- 1-38. For a steam injector to operate properly, the water supply should not be hotter than
1. 120°
  2. 140°
  3. 160°
  4. 180°
- 1-39. The root valve in the main steam line serves what function?
1. To blow down a boiler
  2. To shut off steam in an emergency
  3. To connect a boiler to the auxiliary steam line
  4. To allow air to enter and escape the boiler
- 1-40. Floats are used in boiler instruments to control the
1. pressure between inlet and outlet points
  2. incoming and outgoing flow of water
  3. mixed flow of air and fuel
  4. mixed flow of water and steam
- 1-41. Of the following functions, which one is NOT a function of a pressure control?
1. To control the pressure in the boiler
  2. To secure the fuel-burning equipment when pressure reaches a predetermined cutout
  3. To control the flow of mixed water and steam
  4. To start the fuel-burning equipment when pressure drops to the cut-in point

- 1-42. A modulating motor controls the operation of the oil valve and the air shutters on a boiler to regulate the rate of firing. What factors causes the modulating motor to operate?
1. Fuel oil pressure
  2. Feedwater regulator
  3. Pressure-regulating valve
  4. Electrical imbalance created by pressure change signals to the pressuretrol
- 1-43. The rate at which combustion air is delivered can be changed by throttling the intake to the blower by opening or closing the air damper.
1. True
  2. False
- 1-44. Normal atomizing pressures are generally within what range?
1. 75 to 85 psi
  2. 95 to 105 psi
  3. 95 to 120 psi
  4. 105 to 120 psi
- 1-45. When the pilot flame is not established and confirmed, the flame failure control must create a safety shutdown within how many seconds after lighting?
1. 15 seconds
  2. 10 seconds
  3. 7 seconds
  4. 4 seconds
- 1-46. What meter is used in controlling the relationship between air required and air actually supplied to burn the fuel in a boiler?
1. Draft meter
  2. Steam and air flowmeter
  3. Air analyzer
  4. Air pressure meter
- 1-47. A draft gauge is essential to boiler operation safety.
1. True
  2. False
- 1-48. What is the most widely used method for internally treating boiler water?
1. Alkaloid-chlorine-tannin
  2. Benzene-hexchloride-tannin
  3. Borax-sulfate-tannin
  4. Alkaline-phosphate-tannin
- 1-49. Which of the following tests is NOT used to test boiler water?
1. Tannin
  2. Caustic alkalinity
  3. Sodium sulfide
  4. Phosphate
- 1-50. When performing a phosphate test, you should not use concentrated stannous chloride that is more than
1. 1 month old
  2. 2 months old
  3. 3 months old
  4. 6 months old

- 1-51. When a phosphate test is being performed, which of the following readings would indicate a high level of phosphate?
1. 70 ppm
  2. 60 ppm
  3. 50 ppm
  4. 40 ppm
- 1-52. You are collecting a boiler water sample for a caustic alkalinity test without tannin. The water temperature should be
1. 160°F or above
  2. 120°F or below
  3. 80°F or above
  4. 70°F or below
- 1-53. What test is run to determine the degree of acidity in a boiler water sample?
1. Caustic alkalinity test with tannin
  2. Caustic alkalinity test without tannin
  3. Sodium sulfite test
  4. pH test
- 1-54. The condensate pH normal acceptable range is between
1. 6 and 6.5
  2. 7 and 7.5
  3. 8 and 8.5
  4. 9 and 9.5
- 1-55. Of the following cleaning methods, which one is NOT a method of cleaning boiler firesides?
1. Wet-steam lancing
  2. Sweating
  3. Cold-water washing
  4. Wire brush and scraper cleaning
- 1-56. The method used most often to clean superheaters and economizers is by hot-water washing.
1. True
  2. False
- 1-57. When performing wet-steam lancing, you should ensure the steam pressure is maintained between
1. 50 to 100 psig
  2. 60 to 120 psig
  3. 80 to 170 psig
  4. 70 to 150 psig
- 1-58. What cleaning method is used to remove fireside slag from the convection superheaters?
1. Wet-steam lancing
  2. Sweating
  3. Hot-water washing
  4. Wire brush and scraper cleaning
- 1-59. What is the most common type of tube cleaner used to clean the watersides of the generating tubes?
1. Hydraulic turbine-driven
  2. Pneumatic turbine-driven
  3. Electric turbine-driven
  4. Hydropneumatic turbine-driven
- 1-60. Before cleaning boiler tubes, you should ensure that there is
1. varying size brushes for varying size tubes
  2. a checklist of all tubes requiring cleaning
  3. adequate ventilation and lighting
  4. no damage to the safety valves

1-61. Which of the following factors is NOT an advantage of using acid to clean a boiler?

1. Less outage time is required
2. Less dismantling of the unit
3. Performs a more thorough job
4. Less safety equipment required

1-62. Which of the following types of acid is frequently used for cleaning boilers?

1. Citric
2. Hydrochloric
3. Sulfuric
4. Phosphoric

1-63. What type of acid is used to remove boiler waterside deposits?

1. Citric
2. Hydrochloric
3. Phosphoric
4. Sulfamic

1-64. When inhibitors are not added, acid solutions attack boiler metal as readily as they attack the deposits.

1. True
2. False

1-65. Of the following chemical solutions, which one is NOT a neutralizing solution?

1. Soda ash
2. Trisodium phosphate
3. Sulfite phosphate
4. Sodium tripolyphosphate